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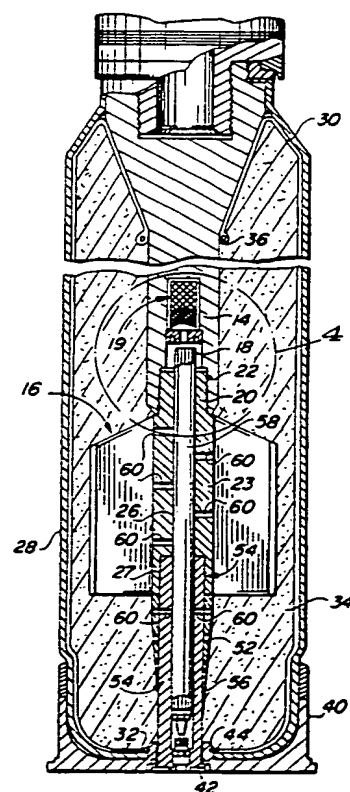
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US89/02529 (22) International Filing Date: 9 June 1989 (09.06.89) (30) Priority data: 204,814 10 June 1988 (10.06.88) US (71) Applicant: HONEYWELL INC. [US/US]; Honeywell Plaza, Minneapolis, MN 55408 (US). (72) Inventors: DICKOVICH, Thomas, E. ; 8924, 48th Avenue North, Minneapolis, MN 55428 (US). NEUBAUER, Steven, P. ; 15357, 92nd Place North, Maple Grove, MN 55369 (US). (74) Agents: BLINN, Clyde, C. et al.; Honeywell Inc. MN12-8251, Honeywell Plaza, Minneapolis, MN 55408 (US).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>Without international search report and to be republished upon receipt of that report.</i>

(54) Title: PROPELLANT CHARGE IGNITION SYSTEM FOR A CARTRIDGE-MOUNTED PROJECTILE**(57) Abstract**

An improved ignition system for a fin-stabilized, high intrusion projectile (10) comprises an elongated boom (14) and a hollow fin assembly (16) which extends rearwardly into an external cartridge case (28) containing a consumable containment bag (30) filled with granular propellant (34), and which fits slidably over a primer (54). The primer (54) comprises a stub flash tube (56) extending through the base (40) of the external cartridge case (28) and a long igniter cartridge (58) fitted within the axial bore of the stub flash tube (56). The outer walls of the igniter cartridge (58) are fabricated from a combustible material such as paper, and the interior of the igniter cartridge (58) is filled with strands of benite or a similar explosive. Both the stub flash tube (56) and the hub (17) of the fin assembly (16) are provided with a plurality of transverse drilled flash holes or openings (60) which permit the flame and hot gases from the benite or the like within the igniter cartridge (58) to spread to the granular propellant (34) in the outer cartridge.



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PROPELLANT CHARGE IGNITION SYSTEM FOR A CARTRIDGE-MOUNTED PROJEC-
TILEBACKGROUND OF THE INVENTION5 1. Field of the Invention

 This invention relates in general to ammunition
and explosives and, more particularly, to an ignition
system for a high intrusion projectile having a
10 granular propellant propulsion system.

2. Description of the Prior Art

 The use of flash tubes in the ignition systems of
15 fixed and semifixed gun and cannon ammunition is
generally well known. One example of a round having a
flash tube in its ignition system is shown in U.S.
Patent No. 2,872,864 to Barnes et al. The patent to
Barnes et al. discloses a fin-stabilized round having
20 an elongated hollow boom. The outer wall of the boom is
secured by means of a frangible section to a filler
plug at the bottom of the cartridge case for the round.

The axial bore of the boom is slidably fitted over a metallic center-guide stud which projects forwardly through a bore in the filler plug. The center-guide stud includes an axial flash passage which communicates at its rear end with a primer located at the bottom of the cartridge case and at its front end with the bore of the boom. The bore of the boom in turn communicates with a plurality of transversely drilled holes which communicate with the interior of the cartridge case.

5 In firing the round, the primer is detonated, causing a flame front to travel forwardly through the flash passage in the center-guide stud and outwardly through the transversely drilled holes in the boom to ignite the propellant charge in the cartridge case. The

10 forward force of propulsion is intended to cause the frangible section at the rear of the boom to fracture, allowing the round to travel up the bore of the weapon and out of the cartridge case. At the same time, the center-guide stud offers guidance to the round and

15 prevents the tail fins from bearing against the side walls of the cartridge case.

20

A serious limitation of the ignition system disclosed by Barnes et al is that the arrangement of the transversely drilled flash holes in the boom does not allow for uniform flame permeation in the bed of

25 propellant in the cartridge case. In addition, the

ignition system is expensive, difficult to assemble, and difficult to pack with the propellant charge.

One attempt to overcome the above limitations is described in U.S. Patent No. 4,572,078 to Bell, which
5 discloses an ignition booster to be used either in place of or in addition to a flash tube. More specifically, the ignition booster consists of a thin film of case-bonded nitrocellulose located on the inside walls and base of the cartridge case. This
10 arrangement allows the booster propellant to be spread out over a greater surface area than is possible within a conventional flash tube. Thus, more uniform permeation of the propellant bed is possible, resulting in enhanced flame spread. However, the round shown by
15 Bell lacks any kind of center-guide or support for increasing the radial stiffness of the round. Thus, the round and its casing are subject to lateral movement during handling and an unacceptable degree of dispersion during firing.

20 Therefore, a need exists for an improved propellant charge ignition system which enhances flame spread through a granular propellant while also providing projectile boom support.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved ignition system for a fin-stabilized, high intrusion projectile comprises an elongated boom and a hollow fin assembly which extends rearwardly into an external cartridge case containing a consumable containment bag filled with granular propellant, and which fits slidably over a primer. The primer comprises a stub flash tube secured to the base of the external cartridge and a long igniter cartridge fitted within the axial bore of the stub flash tube. The outer walls of the igniter cartridge are fabricated from a combustible material such as paper, and the interior of the igniter cartridge is filled with strands of benite or a similar explosive. Both the stub flash tube and the hub of the fin assembly are provided with a plurality of transverse flash holes or openings which permit the flame and hot gases from the benite or the like within the igniter cartridge to spread to the granular propellant in the propellant containment bag. A perforated, tapered fill tube, fabricated from thin consumable aluminum, is fitted over the stub flash tube and the rear end of the fin assembly, allowing the granular propellant to flow smoothly into the

propellant containment bag during filling, and preventing trapping or clumping of the propellant grains in the vicinity of the fins.

When the primer is ignited, the flame and hot gases from the benite cause the consumable fill tube as well as the outer walls of the igniter cartridge and the containment bag to burn along with the granular propellant, thus producing additional propellant gases. This results in more uniform flame spread and more effective ignition than in prior art ignition systems. In addition, the configuration of the stub flash tube provides increased radial stiffness and truer alignment of the cartridge case to the projectile prior to firing.

Accordingly, it is an object of this invention to provide an improved ignition system for a high intrusion projectile which utilizes granular propellant.

Another object of the invention is to provide an ignition system with an extended primer comprising an elongated ignition cartridge fitted within a stub flash tube and extending into the interior of the boom of a projectile, the flash tube and ignition cartridge serving to provide increased radial stiffness and keep the projectile centered within the outer cartridge case.

Still another object of the invention is to provide an improved ignition system with various components fabricated from combustible materials to increase the igniting effect of the granular propellant within the round.

Yet another object of the invention is to provide an inexpensive ignition system which is easy to load and assemble.

The foregoing and other objects of the invention, as well as the invention itself, may be more fully understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a perspective view of a high intrusion projectile having the ignition system of the present invention.

FIG.2 is an enlarged sectional view taken through line 2-2 of FIG. 1.

FIG. 3 is an enlarged fragmentary view of the base portion of the projectile and ignition system.

FIG. 4 is an enlarged fragmentary view of the circled region 4 of FIG. 2.

15

FIG. 5 is a perspective view showing the elements of the ignition system and high intrusion projectile in exploded relationship to one another.

20

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, Figs. 2-5 show the ignition system of the present invention in combination with a high intrusion projectile 10 including a shaped charge warhead 12 having a cylindrical outer surface for contacting the smooth bore of a weapon (not shown).

The aft portion of the projectile 10 includes an elongated boom 14. A fin assembly 16 having a central hub 17 is attached to the rear of the boom 14. The rearward end of the boom 14 defines an axial bore 18, the front portion of which contains a tracer assembly 19 for the round. The rear portion of the bore 18 is internally threaded as shown at 20 to receive mating threads 22 on the hub 17 of the fin assembly 16. An axial bore 26 through the hub 17 of the fin assembly 16 communicates with the axial bore 18 in the boom 14. The rear portion of the axial bore 26 is enlarged to define a counterbore 27, the purpose of which will be later explained.

The boom 14 and the fin assembly 16 of the projectile 10 extend rearwardly into a forwardly tapering external cartridge case 28 which is preferably formed of combustible pressed paper. A propellant containment bag 30 formed from viscose "Rayon" fabric

prevents propellant spillage if the cartridge case 28 is ruptured by mishandling. The rear of the propellant containment bag 30 includes a fill port 32 through which loose granular propellant 34 is poured when the cartridge is loaded. The mouth 36 of the bag 30 is provided with a drawstring 38 which is used to secure the bag 30 tightly over the elongated boom 14 of the projectile.

A base assembly 40 mounted at the rear end of the external cartridge case 28 seals the external cartridge case 28 and the propellant containment bag 30, and prevents the propellant charge from spilling out. A central opening 42 in the base assembly allows access to the fill port 32 in the propellant containment bag 30. An annular boss 44 which surrounds the central opening 42 and extends inwardly into the cartridge includes a circumferential groove 46 which receives a retaining ring 48 for clamping the rear end of the propellant containment bag 30 and the external cartridge case 28 against the flat inner surface of the base assembly 40. Additionally, a resilient spring disk 50 mounted between the propellant containment bag 30 and the retainer ring 48 biases the elements of the cartridge case 28 toward the base assembly 40 and improves the tightness of this interface.

A perforated, tapered fill tube 52 fabricated from consumable aluminum is secured to the rear end of the fin assembly 16 to allow the granular propellant 34 to flow smoothly and uniformly through the fill port 32 and into the interior of the propellant containment bag 30 during loading. Additionally, the fill tube (52) allows more propellant (34) to be charged into the cartridge while keeping it from falling into the axial bore (26) through the fin assembly.

Once the granular propellant 34 has been loaded into the propellant containment bag 30, an electric primer 54 is inserted through the central opening 42 in the base assembly 40 and the fill port 32 in the propellant containment bag 30. The primer 54 comprises a stub flash tube 56, the forward end of which is slidably received in the counterbore 27 of the axial bore 26 through the hub 17 of the fin assembly 16, thus providing support for the boom 14 and increasing the radial stiffness of the assembly.

The stub flash tube 56 contains a long igniter cartridge 58 which extends through the entire length of the axial bore 26 in the hub 17 of the fin assembly 16 and continues into the bore 18 of the boom, terminating slightly rearwardly of the tracer assembly 19. The outer walls of the igniter cartridge 58 are fabricated from a combustible material such as paper, and the

interior of the igniter cartridge 58 is filled with strands of benite or a similar explosive. Both the stub flash tube 56 and the hub 17 of the fin assembly 16 are provided with a plurality of transverse flash
5 holes or openings 60 which permit the flame and hot gases from the burning benite or the like within the igniter cartridge 58 to spread to the granular propellant 34 in the propellant containment bag 30.

When the primer 54 is ignited, the flame and hot
10 gases from the benite cause the consumable fill tube 52 as well as the outer walls of the igniter cartridge 58, the containment bag 30, and the cartridge case 28 to burn along with the granular propellant 34, thus producing additional propellant gases. The impetus
15 provided by these propellant gases causes the projectile 10 to travel up the bore of the weapon. Because the stub flash tube 56 supported the projectile 10 in a centered position within the cartridge case 28 before firing, the projectile's passage into the bore
20 of the weapon will be unimpeded and its deviation from the desired trajectory after leaving the weapon case 28 is therefore minimal.

While the principles of the invention have now been made clear in the illustrated embodiment, there
25 will be immediately obvious to those skilled in the art, many modifications of structure, arrangements,

proportions, the elements, materials and components used in the practice of the invention and otherwise, which are particularly adapted of specific environments and operation requirements without departing from these principles. The appended claims are therefore intended to cover and embrace any such modifications within the limits only of the true spirit and scope of the invention.

CLAIMS

5 1. An ammunition round comprising:

I) a projectile (10), said projectile (10) including

a) a warhead (12);

10 b) a boom (14) and fin assembly (16) formed rearwardly of said warhead (12), said boom (14) and fin assembly (16) having an axial bore (18, 26, 27) formed in the rearward end thereof; and

II) a cartridge assembly, said cartridge assembly including

15 a) an external cartridge case (28) containing a loose granular propellant (34), said boom (14) and fin assembly (16) and a portion of said warhead (12) being positioned in said external cartridge case (28) and surrounded by said granular propellant (34);

20 b) a base assembly (40) sealingly engaging the rear end of said external cartridge case (28); and

c) a primer (54) extending forwardly from said base assembly (40), said primer (54) including

25 i) a stub flash tube (56), said stub flash tube (56) having a forward end, said forward end being slidably received in said axial bore (27) in said

(Claim 1 continued)

boom (14) and fin assembly (16) to provide support for said boom (14) and fin assembly (16) and to increase the radial stiffness of said ammunition round, said stub flash tube (56) also comprising a plurality of transversely extending flash holes (60) communicating with the interior of said external cartridge case (28); and

10 11) an elongated igniter cartridge (58) positioned within said flash tube (56) and extending through said axial bore (18, 26, 27) in said boom (14) and fin assembly (16), said igniter cartridge (58) being formed from a combustible material and being
15 filled with explosive material.

2. The ammunition round of claim 1, in which said igniter cartridge (58) is formed from paper.

20 3. The ammunition round of claim 1, in which said igniter cartridge (58) is filled with strands of benite.

4. The ammunition round of claim 1, further comprising
25 a fill tube (52) secured to the rear end of said boom (14) and fin assembly (16) to facilitate smooth and

(Claim 4 continued)

uniform pouring of said granular propellant (34) into said external cartridge case (28) during loading.

5

5. The ammunition round of claim 4, in which said fill tube (52) comprises a plurality of perforations for allowing flames and hot gases from said igniter cartridge (58) to spread to the granular propellant (34) in said external cartridge case (28).

10

6. The ammunition round of claim 4, in which said fill tube (52) is fabricated from a consumable material.

15

7. The ammunition round of claim 6, in which said fill tube (52) is made of consumable aluminum.

8. An ammunition round comprising:

20

I) a high intrusion projectile (10), said projectile (10) including

a) a warhead (12);

25

b) an elongated boom (14) formed rearwardly of said warhead (12), said boom (14) having an axial bore (18) formed in the rearward end thereof, said axial bore (18) containing a tracer assembly (19); and

(Claim 8 continued)

5 c) a fin assembly (16), said fin assembly (16) comprising a plurality of fins projecting radially from a hub (17), said hub (17) having an axial bore (26) formed therethrough, said axial bore (26) having a front opening communicating with said axial bore (18) in said boom (14), and having an enlarged diameter rear opening defining a counterbore (27), said hub (17) further including a plurality of transversely extending flash holes (60) communicating with said axial bore (26); and

10 II) a cartridge assembly, said cartridge assembly including

15 a) an external cartridge case (28);
b) a propellant containment bag (30) located within said external cartridge case (28), said propellant containment bag (30) being fabricated from a consumable material and being filled with a loose granular propellant (34), said boom (14) and said fin assembly (16) and a portion of said warhead (12) being positioned in said propellant containment bag (30) and surrounded by said granular propellant (34);

20 c) a base assembly (40) sealingly engaging
25 the rear end of said external cartridge; and

(Claim 8 continued)

d) a primer (54) extending forwardly from said base assembly (40), said primer (54) including

5 1) a stub flash tube (56), said stub flash tube (56) having a forward end, said forward end being slidably received in said counterbore (27) of said axial bore (26) through said hub (17) of said fin assembly (16) to provide support for said boom (14) and
10 increase the radial stiffness of said ammunition round, said stub flash tube (56) also comprising a plurality of transversely extending flash holes (60) communicating with the interior of said granular propellant containment bag (30); and

15 1i) an elongated igniter cartridge (58) positioned within said flash tube (56) and extending through the entire length of said axial bore (26) in said hub (17) of said fin assembly (16) and continuing into the bore (18) of said boom (14), terminating
20 slightly rearwardly of said tracer assembly (19), said igniter cartridge (58) being formed from a combustible material and being filled with explosive material.

9. The ammunition round of claim 8, in which said
25 propellant containment bag (30) is fabricated from consumable viscose "Rayon" material.

10. The ammunition round of claim 8, in which said igniter cartridge (58) is formed from paper.

5 11. The ammunition round of claim 8, in which said igniter cartridge (58) is filled with strands of benite.

10 12. The ammunition round of claim 8, further comprising
a fill tube (52) secured to the rear end of said fin assembly (16) to facilitate smooth and uniform pouring of said granular propellant (34) into said propellant containment bag (30) during loading.

15

13. The ammunition round of claim 12, in which said fill tube (52) comprises a plurality of perforations for allowing flames and hot gases from said igniter cartridge (58) to spread to the granular propellant
20 (34) in said propellant containment bag (30).

25

14. The ammunition round of claim 12, in which said fill tube (52) is fabricated from a consumable material.

15. The ammunition round of claim 14, in which said fill tube (52) is made of consumable aluminum.

16. An ammunition round comprising:

- 5 I) a high intrusion projectile (10), said projectile (10) including
- a) a shaped charge warhead (12);
 - b) an elongated boom (14) formed rearwardly of said warhead (12), said boom (14) having an axial
10 bore (18) formed in the rearward end thereof, said axial bore (18) containing a tracer assembly (19); and
 - c) a fin assembly (16), said fin assembly (16) comprising a plurality of fins projecting radially from a hub (17), said hub (17) having an axial bore
15 (26) formed therethrough, said axial bore (26) having a front opening communicating with said axial bore (18) in said boom (14), and having an enlarged diameter rear opening defining a counterbore (27), said hub (17) further including a plurality of transversely extending
20 flash holes (60) communicating with said axial bore (26); and
- II) a cartridge assembly, said cartridge assembly including
- a) a forwardly tapering external cartridge
25 case (28);

(Claim 16 continued)

b) a propellant containment bag (30) secured to the inner walls of said external cartridge case (28), said propellant containment bag (30) being
5 fabricated from a consumable material and being filled with a loose granular propellant (34), said propellant containment bag (30) having a rear end with a fill port (32) for receiving said granular propellant (34) and
10 having a front end defining a mouth (36), said mouth (36) being tightly secured about the boom (14) of said projectile (10);

c) a base assembly (40) sealingly engaging the rear end of said external cartridge, said base assembly
15 (40) including a central opening (42) communicating with said fill port (32) in said propellant containment bag (30); and

d) an electric primer (54) extending through said central opening (42) in said base assembly (40)
20 and said fill port (32) in said propellant containment bag (30), said electric primer (54) including

1) a stub flash tube (56), said stub flash tube (56) having a forward end, said forward end being slidably received in said counterbore (27) of
25 said axial bore (26) through said hub (17) of said fin assembly (16) to provide support for said boom (14) and

(Claim 16 continued)

increase the radial stiffness of said ammunition round, said stub flash tube (56) also comprising a plurality of transversely extending flash holes (60) communicating with the interior of said granular propellant containment bag (30); and

11) an elongated igniter cartridge (58) positioned within said flash tube (56) and extending through the entire length of said axial bore (26) in said hub (17) of said fin assembly (16) and continuing into the bore (18) of said boom (14), terminating slightly rearwardly of said tracer assembly (19), said igniter cartridge (58) being formed from a combustible material and being filled with explosive material.

17. The ammunition round of claim 16, further comprising a tapered fill tube (52) for facilitating smooth and uniform pouring of said granular propellant (34) into said granular propellant bag (30) during loading, said fill tube (52) having a wide end secured to said hub (17) of said fin assembly (16) and a narrow end fitted over said stub flash tube (56), said fill tube (52) being fabricated from consumable material and comprising a plurality of perforations for allowing flames and hot gases from said igniter cartridge (58)

(Claim 17 continued)

to spread to the granular propellant (34) in said propellant containment bag (30).

5

18. The ammunition round of claim 17, in which said propellant containment bag (30) is fabricated from consumable viscose "Rayon" material.

10

19. The ammunition round of claim 17, in which said mouth (36) of said propellant containment bag (30) is secured about the boom (14) of said projectile (10) by means of a drawstring (38).

15

20. The ammunition round of claim 17, in which said igniter cartridge (58) is formed from paper and filled with strands of benite.

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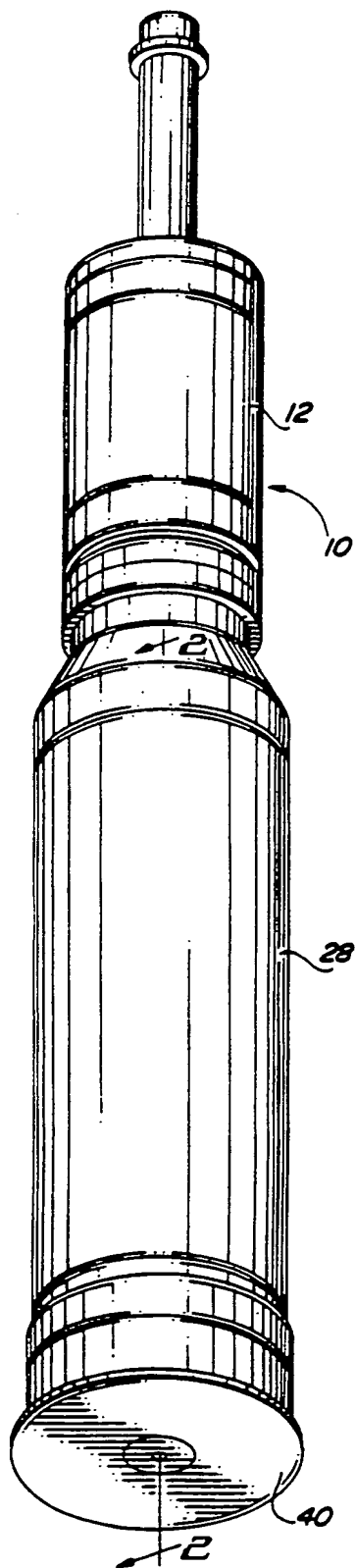


FIG. 1

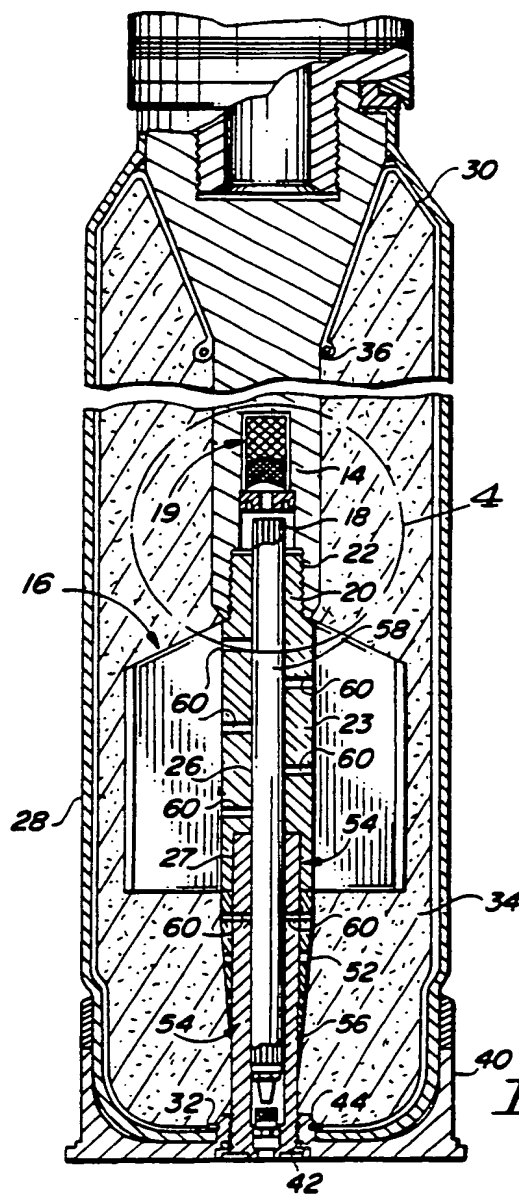


FIG. 2

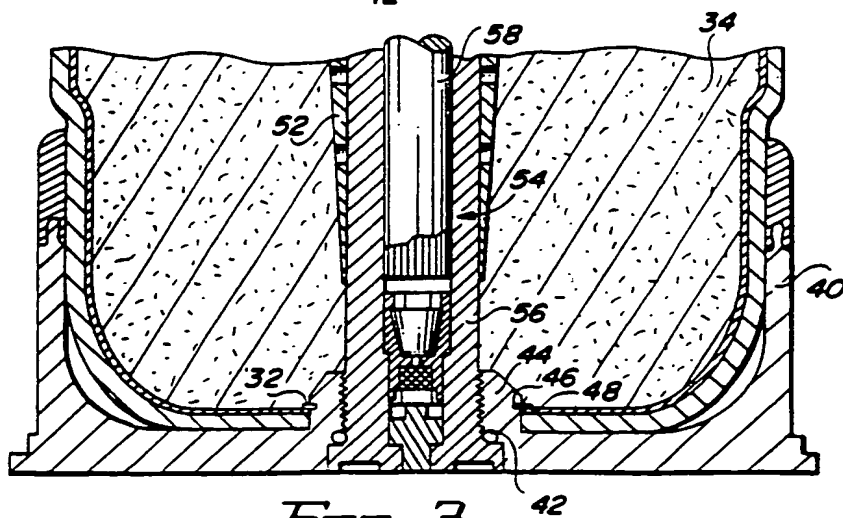


FIG. 3

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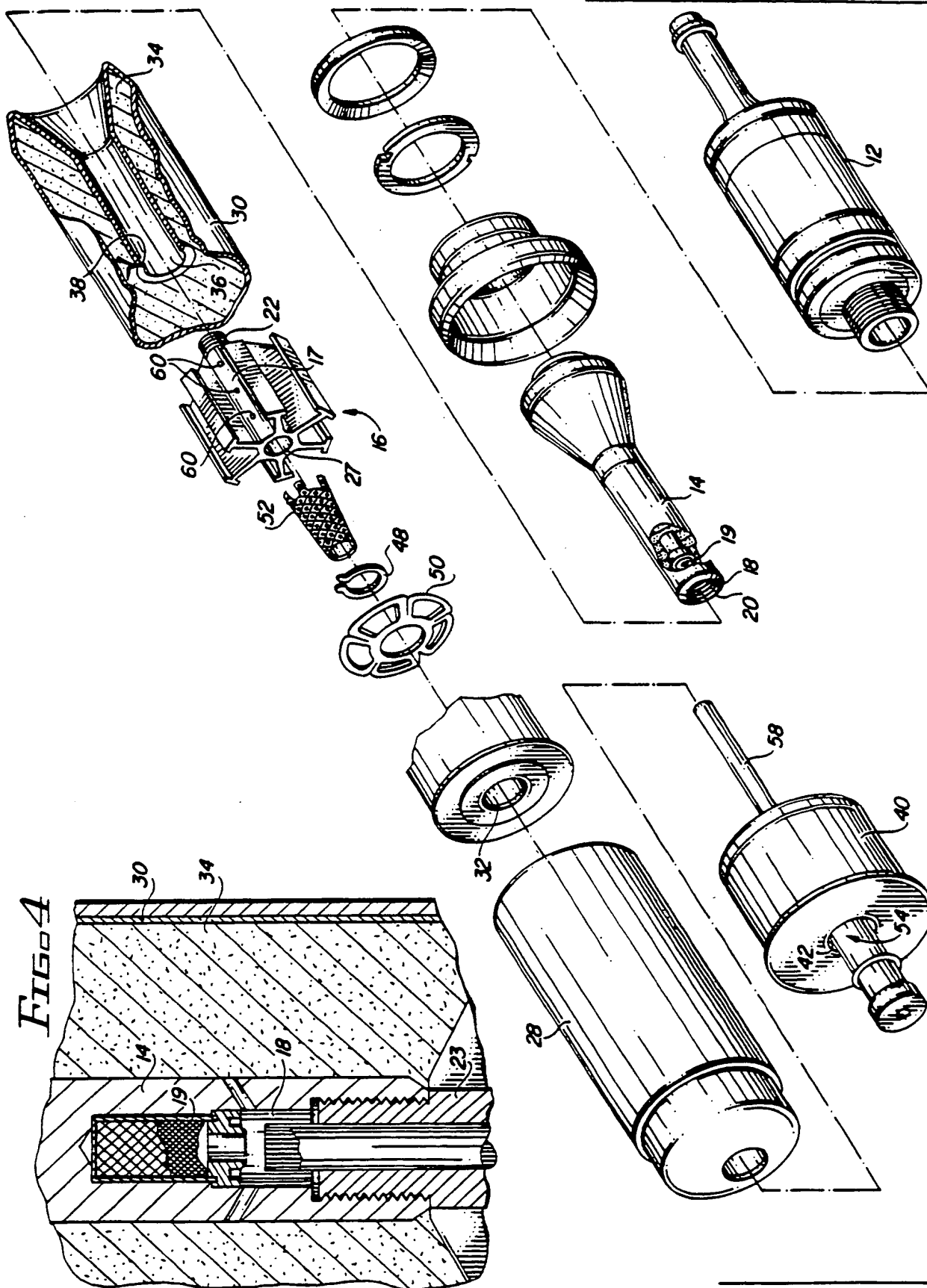


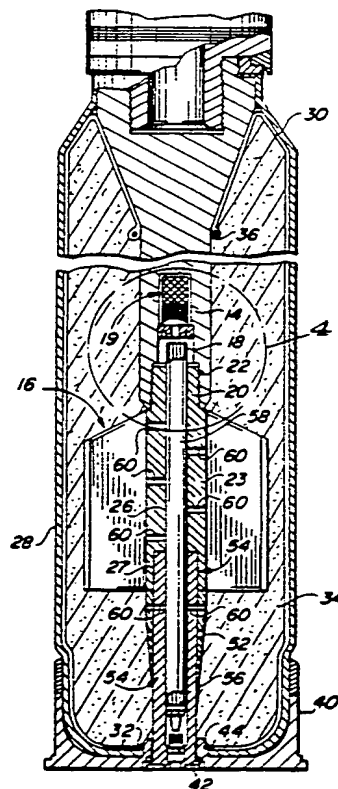
FIG 5

FIG 4

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(21) International Application Number: PCT/US89/02529 (22) International Filing Date: 9 June 1989 (09.06.89) (30) Priority data: 204,814 10 June 1988 (10.06.88) US (71) Applicant: HONEYWELL INC. [US/US]; Honeywell Plaza, Minneapolis, MN 55408 (US). (72) Inventors: DICKOVICH, Thomas, E. ; 8924, 48th Avenue North, Minneapolis, MN 55428 (US). NEUBAUER, Steven, P. ; 15357, 92nd Place North, Maple Grove, MN 55369 (US). (74) Agents: BLINN, Clyde, C. et al.; Honeywell Inc. MN12-8251, Honeywell Plaza, Minneapolis, MN 55408 (US).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 11 January 1990 (11.01.90)
(54) Title: PROPELLANT CHARGE IGNITION SYSTEM FOR A CARTRIDGE-MOUNTED PROJECTILE (57) Abstract <p>An improved ignition system for a fin-stabilized, high intrusion projectile (10) comprises an elongated boom (14) and a hollow fin assembly (16) which extends rearwardly into an external cartridge case (28) containing a consumable containment bag (30) filled with granular propellant (34), and which fits slidably over a primer (54). The primer (54) comprises a stub flash tube (56) extending through the base (40) of the external cartridge case (28) and a long igniter cartridge (58) fitted within the axial bore of the stub flash tube (56). The outer walls of the igniter cartridge (58) are fabricated from a combustible material such as paper, and the interior of the igniter cartridge (58) is filled with strands of benite or a similar explosive. Both the stub flash tube (56) and the hub (17) of the fin assembly (16) are provided with a plurality of transverse drilled flash holes or openings (60) which permit the flame and hot gases from the benite or the like within the igniter cartridge (58) to spread to the granular propellant (34) in the outer cartridge.</p>		



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INTERNATIONAL SEARCH REPORT

International Classification No.

PCT/US 89/02529

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 4 F42B5/073 ; F42C19/08		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 4	F42B ; F42C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	GB,A,2167840 (RHEINMETALL) 04 June 1986 see page 2, lines 45 - 68; figure 7	1-3
A	---	8, 16
Y	US,A,3182595 (HASSMANN) 11 May 1965 see column 1, lines 13 - 20 and line 72 see column 2, lines 1 - 11; figure	1-3
A	---	10, 11, 20
A	EP,A,0196021 (DIEHL) 01 October 1986 see page 3, lines 14 - 31 see page 4, lines 1 - 8; figure	1
A	EP,A,0158121 (RHEINMETALL) 16 October 1985 see page 5, lines 1 - 18 see page 6, lines 21 - 36 see page 7, lines 1 - 13; figures 1-3	1-3

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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
2 30 OCTOBER 1989	30. 11. 89	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	T.K. WILLIS	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,2872864 (BARNES) 10 February 1959 (cited in the application) ---	
A	BE,A,562565 (SOMVILLE) 03 June 1960 ---	
A	FR,A,1125503 (BOFORS) 31 October 1956 ---	

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PCT/USA 89/0252
SA 30281

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A-3182595		None	
EP-A-0196021	01-10-86	DE-A- 3510635	25-09-86
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US-A-2872864		None	
BE-A-562565		None	
FR-A-1125503		BE-A- 536577 CH-A- 336294 DE-B- 1026666 GB-A- 765169 GB-A- 765170 NL-C- 95893	

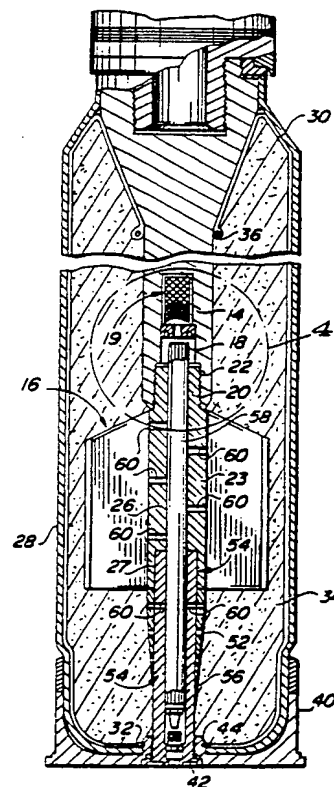
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : F42B 5/073, F42C 19/08	A3	(11) International Publication Number: WO 89/12211 (43) International Publication Date: 14 December 1989 (14.12.89)
(21) International Application Number: PCT/US89/02529 (22) International Filing Date: 9 June 1989 (09.06.89) (30) Priority data: 204,814 10 June 1988 (10.06.88) US (71) Applicant: HONEYWELL INC. [US/US]; Honeywell Plaza, Minneapolis, MN 55408 (US). (72) Inventors: DICKOVICH, Thomas, E. ; 8924, 48th Avenue North, Minneapolis, MN 55428 (US). NEUBAUER, Steven, P. ; 15357, 92nd Place North, Maple Grove, MN 55369 (US). (74) Agents: BLINN, Clyde, C. et al.; Honeywell Inc. MN12-8251, Honeywell Plaza, Minneapolis, MN 55408 (US).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 11 January 1990 (11.01.90)

(54) Title: PROPELLANT CHARGE IGNITION SYSTEM FOR A CARTRIDGE-MOUNTED PROJECTILE

(57) Abstract

An improved ignition system for a fin-stabilized, high intrusion projectile (10) comprises an elongated boom (14) and a hollow fin assembly (16) which extends rearwardly into an external cartridge case (28) containing a consumable containment bag (30) filled with granular propellant (34), and which fits slidably over a primer (54). The primer (54) comprises a stub flash tube (56) extending through the base (40) of the external cartridge case (28) and a long igniter cartridge (58) fitted within the axial bore of the stub flash tube (56). The outer walls of the igniter cartridge (58) are fabricated from a combustible material such as paper, and the interior of the igniter cartridge (58) is filled with strands of benite or a similar explosive. Both the stub flash tube (56) and the hub (17) of the fin assembly (16) are provided with a plurality of transverse drilled flash holes or openings (60) which permit the flame and hot gases from the benite or the like within the igniter cartridge (58) to spread to the granular propellant (34) in the outer cartridge.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 89/02529

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶According to International Patent Classification (IPC) or to both National Classification and IPC
Int.Cl. 4 F42B5/073 ; F42C19/08

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System

Classification Symbols

Int.Cl. 4

F42B ; F42C

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Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	GB,A,2167840 (RHEINMETALL) 04 June 1986 see page 2, lines 45 - 68; figure 7	1-3
A	---	8, 16
Y	US,A,3182595 (HASSMANN) 11 May 1965 see column 1, lines 13 - 20 and line 72 see column 2, lines 1 - 11; figure	1-3
A	---	10, 11, 20
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	EP,A,0158121 (RHEINMETALL) 16 October 1985 see page 5, lines 1 - 18 see page 6, lines 21 - 36 see page 7, lines 1 - 13; figures 1-3 ---	
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IV. CERTIFICATION

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